

Name: _____

Date: _____

Math 10F&PC Chapter 6 Linear Functions**6.5: Slope-Point Form of the Equation for a Linear Function**Recall from last time, the slope-intercept form of the equation of a line is $y = mx + b$,where "m" = slope of the line "b" = y intercept

In section 6.5, we will look at another way to express the equation of a linear function.

Example 1: Given a line with slope -4 and passes through point P(2, -2), find the equation of the line using the definition of slope. Then move the terms around to have the numerator by itself.

$$m = \frac{\text{rise}}{\text{run}}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{y - y_1}{x - x_1}$$

$$m(x - x_1) = y - y_1$$

line goes through
Point (x_1, y_1)

$$m = -4$$

$$\text{slope} = y_{\text{int}} =$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{y - y_1}{x - x_1}$$

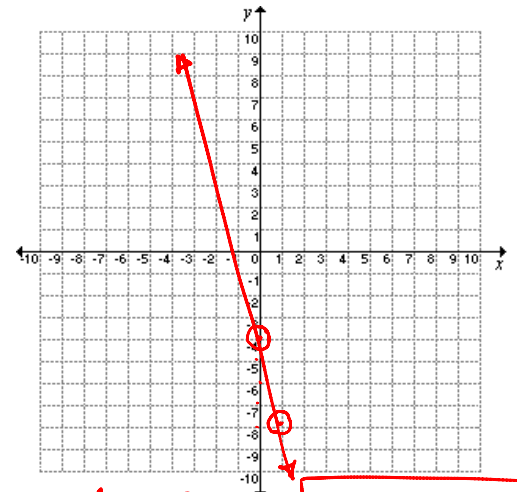
$$-4 = \frac{y + 2}{x - 2}$$

$$y + 2 = -4(x - 2)$$

$$y + 2 = -4x + 8$$

$$y - 2 = -4x + 6$$

$$y = -4x + 6$$

This equation is called the slope - Point form, as both the slope and the coordinates of a point on that line can be easily identified by the equation.

$$y = mx + b$$

$$m(x - x_1) = y - y_1$$

Note, you can convert this form into the slope-intercept form by doing some algebra... do it now!

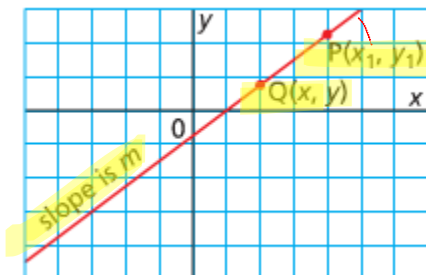
$$m(x - x_1) = y - y_1$$

$$m(x - x_1) + y_1 = y$$

$$y = m(x - x_1) + y_1$$

Get y in the left side

In general, let's try to develop a formula for the slope-point form for the equation of a line.



$$P(x_1, y_1)$$

$$Q = (x, y)$$

$$m = \text{slope}$$

$$m = \frac{y - y_1}{x - x_1}$$

$$m(x - x_1) = y - y_1$$

slope - Point Form for m

SLOPE-POINT FORM of the equation of a linear function....The equation of a line that passes through the point (x_1, y_1) and has slope m is:

$$m(x - x_1) = y - y_1$$

Example 2: Given the equation $y - 5 = -\frac{2}{3}(x + 4)$,

Compare it to the point slope form and determine what point the graph passes through and the slope of this graph. Then graph!

$$y - 5 = -\frac{2}{3}(x + 4)$$

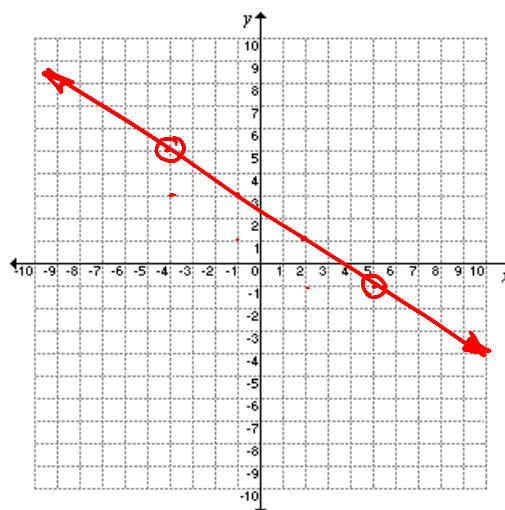
compare

$$y - y_1 = m(x - x_1)$$

Slope $m = -\frac{2}{3}$ Point (x_1, y_1)
Point $(-4, 5)$

$$-x_1 = 4 \quad -y_1 = -5$$

$$\therefore x_1 = -4 \quad y_1 = 5$$



Example 3: Find the equation of a line with slope 4 that passes through the point A(2, 5) using the point-slope form. Then convert it to the **slope intercept** form.

$m = 4$ Point-slope Form $m(x - x_1) = y - y_1$

A(2, 5) sub. Poin (2, 5) in the equation $4(x - 2) = y - 5$ ← slope Point Form

(x_1, y_1) $4x - 8 = y - 5$

$x_1 = 2 \quad y_1 = 5$ $4x - 8 = y - 5$

$y = 4x - 3$ slope-int.

$4x - 3 = y$

Example 4: Write an equation for the line that passes through the point (1, -2) and is:

a) parallel to the line $y = 2x + 5$

slope of the line $m = 2$ point $(1, -2)$

$y - y_1 = m(x - x_1)$

$y - (-2) = 2(x - 1) \Rightarrow y + 2 = 2(x - 1)$

$y + 2 = 2x - 2$

$y = 2x - 4$

b) Perpendicular to the line $y = -3x + 2$

slope of the line $m = \frac{1}{3}$ $(1, -2)$

$x_1 \quad y_1$

$y - y_1 = m(x - x_1)$

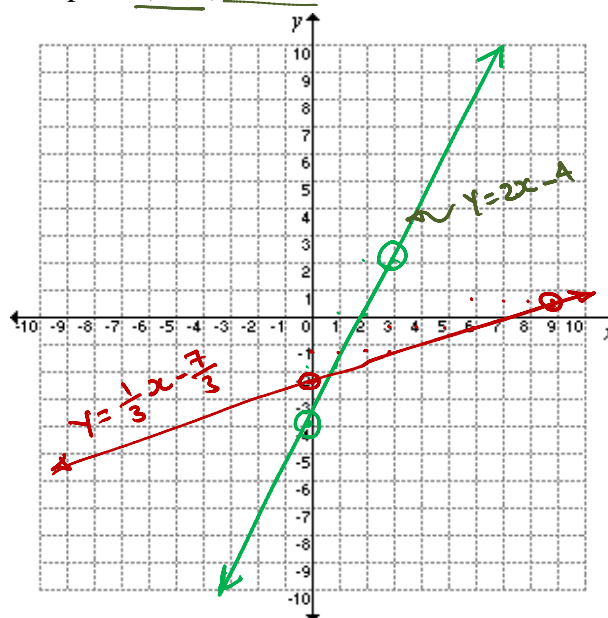
$y - (-2) = \frac{1}{3}(x - 1)$

$y + 2 = \frac{1}{3}x - \frac{1}{3}$

$y = \frac{1}{3}x - \frac{7}{3}$

$y = \frac{1}{3}x - 2\frac{1}{3}$

$y = \frac{1}{3}x - \frac{7}{3}$



$y = mx + b$

$y - y_1 = m(x - x_1)$

Assignment Page 372: (4, 5, 6, 7) do at least 3 from each; 9a, 10, 11 a c
12, 14, 19, 20, 21, 23, challenge: 24, 25, 26